Topic: Annual NFDRS Startup for Seasonal Stations

There are several steps that users of the National Fire Danger Rating System must go through at the start of the season to ensure that the outputs of the system are as representative as possible of their local conditions. They are applicable to all stations but primarily to seasonal stations with a 30-day or longer break in NFDRS observations. (Note: Seasonal stations also include those RAWS sites that are not winterized to provide accurate winter precipitation measurements during freezing conditions.)

Everyone should have ended last season by changing the herbaceous condition to frozen for each of their weather stations. If you didn't do it, it is a good idea to do it before you start work on the current year. This time of year, even if your stations are still covered by snow, you should change the herbaceous state to pre-green and begin entering daily observations to gain the effect spring rain or melting snow has on the larger dead fuels.

Station Initialization – For those units operating NFDRS using the 1978 fuel models, about 45 days prior to start of spring green-up, make sure you have changed the herbaceous vegetation condition in the station catalog to pre-green and that you have begun entering daily weather observations on a regular basis. This allows the model to adjust from default values and develop carryover values more representative of the current season. This step is not necessary if you are using the 1988 fuel models as the required greenness factor entry accommodates the transition from season to season.

Station Green-up – After the snow melts, you need to start monitoring the greening conditions and edit the station catalog to reflect when general green-up begins. Starting it too early can give you erroneous NFDRS outputs for several months. Remember that green-up begins when the majority of the herbaceous and woody plant species begin to actively grow, not when the first indicators of spring growth appear. You should also focus your attention on when the species that become the fire problem later in the season begin their spring growth

Enter in the station catalog the date that general green-up begins in the area being represented by the weather station. This is the calendar date that the majority of the herbaceous plant species have begun their annual growth, the buds on woody shrubs begin to swell, or leaf buds begin to open on deciduous species. Since various plant species respond differently to spring weather changes, the key to identifying when green-up begins is when the majority of the species start to respond to the warming weather conditions.

The following are some things to consider when establishing when the start of Green-up should be declared in NFDRS.

1. **Don't rush it**. Make sure that the spring growing season is actually well under way.

2. Make sure that we are **evaluating the average or typical herbaceous vegetation conditions** (all aspects/all elevations) within the area being represented by the weather station.

3. Evaluate what is happening to the **entire herbaceous and shrub plant community**. Often the south slope cheat grass will start to green as soon as the snow leaves the area while the other species, in particular the low brush, don't start responding until temperatures are much warmer.

4. Remember, that regardless of whatever date you pick to start green-up, **the NFDRS model will reach its maximum live fuel moisture content in 14 days for climate class 2 and 21 days for climate class 3.**

5. After you have started green-up, please monitor the herbaceous and woody fuel moisture values. If they peak before the growing season has actually stopped, you can shift the green-up date in WIMS and recalculate your fuel moistures to reflect the changed condition. It is critical that you maintain continuous weather observations once green-up begins.

***Note**: As an aid to identifying when the green-up process is underway in your area, you should monitor the NDVI (Normalized Departure Vegetation Index) satellite imagery and the GSI (Growing Season Index) each week. Once you see the greenness values increasing, it's an indication that green-up is underway*.

Here is the link to this useful information - http://www.phenmon.org/
(If you have trouble either understanding or interpreting this information…please call Southwest Area Predictive Services)

Initiation of 1000 hr Fuel Moisture – As an alternative to using the default 1000 hr Fuel Moisture value to start of the season (as determined by the climate class of the station) consider using a 1000 hr FM value from a nearby station that is already in operation. This will shorten the time that it takes for this value to equalize with the local environment as well as improve how the herbaceous and woody vegetation responds once green-up is started. Remember to also reset the X-1000 hr FM. During the pre-green and into the early portion of the green condition the 1000 hr and the X-1000 hr FM values should be equal.

Note: *If you have been entering observations throughout the winter months when the fuels may have been covered with snow or the rain gauge frozen, you have most likely been under reporting the affects of precipitation. The NFDRS processor doesn't know the ground is snow covered and uses the air temperature, low humidity values and lack of precipitation to continue to dry the larger dead fuels even though, in reality, they are being affected differently because they are under snow. Your calculated carryover fuel moisture values in the spring are most likely lower than they should be and must be adjusted. If you desire to have year round observations, the use of a heated rain gauge*

and the fuels wet flag are the only way to deal with situations where there are freezing temperatures and/or the fuels are covered with snow.

Keetch-Byram Drought Index Calculation – KBDI provides an indication of incipient drought conditions in the local area. All users are encouraged to accurately maintain this index even though you may not be using 1988 fuel models for your NFDRS calculations. The calculation of the Keetch-Byram Drought Index requires only one additional data input, above those required for normal NFDRS computations. This is an entry in the station catalog of Annual Precipitation. If your NFDRS output shows a -99 for the KBDI value, you have not entered an annual precipitation value in the station catalog. Annual precipitation information can be obtained from Climatology maps for your area, available through your local fire weather office or the following web sites.

Washington: http://www.seawfo.noaa.gov/fire/olm/fire/wa_pcp.jpg

Oregon: http://nimbo.wrh.noaa.gov/Portland/meanpcpn.gif

KBDI Initialization – For weather stations that are not operated year round (such as those without heated rain gages, etc designed to allow for winter operations), the Keetch-Byram Drought Index must be initialized to the current local conditions. Bob Burgan of the Intermountain Station in Missoula developed a simple procedure to initialize KBDI using the most recent Palmer Drought Index data for the local area. The formula is KBDI (start) = 8(100-PFC) where PFC is the percent field capacity of the local soil as determined from Palmer Drought Index information. The following web site can give you the most recent Palmer Drought Index and percent field capacity information by state and drought zone.

http://nic.fb4.noaa.gov/products/analysis_monitoring/cdus/palmer_drought/wpdwest.txt

You can get a map of the various Palmer Drought Index zones in each state by going to the following web sites:

For Oregon: http://www.ncdc.noaa.gov/onlineprod/drought/images/or.gif

For Washington: http://www.ncdc.noaa.gov/onlineprod/drought/images/wa.gif

Monitor your NFDRS outputs and carryover values after green-up is completed. We need to be aware of situations like 1999 when we had little precipitation after snowmelt even though there was high soil moisture. The NFDRS model dried the 1000 hr FM (and the associated X1000 and the herbaceous fuel moisture) while on the ground the residual soil moisture extended the growing season as much as a month longer than normal. Even in the driest of springs your herbaceous fuel moistures should approach 150-175 percent. On wet years it should be in the 200-250 range. Woody fuel moistures should range from 150 on dry years to 200 on wet years. Wet and dry years should be assessed, not only by precipitation during the growing season, but also by residual soil moisture as determined by soil moisture measurements or Palmer Drought Index values. It may be necessary to adjust your carryover herbaceous and woody fuel moisture values to bring them in line with actual conditions on the ground.